



# NORTHERN HARDWOOD NOTES

## Residual Stocking Levels

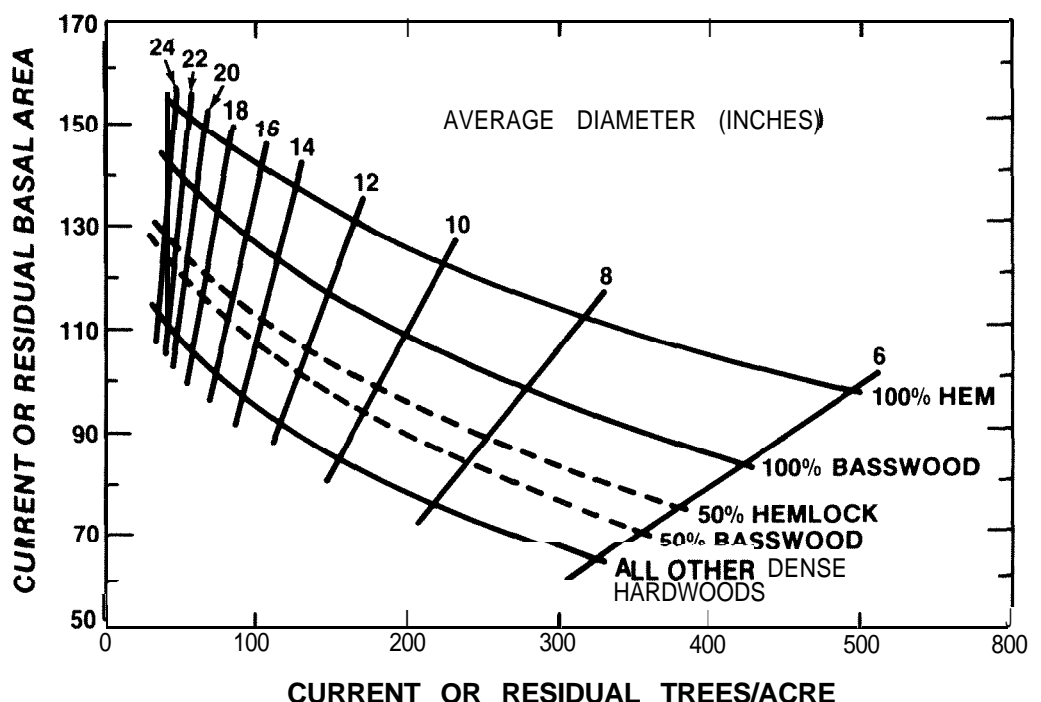
When you “thin” an even-aged stand, or “restructure” an all-aged stand by thinning out certain size classes (both are sometimes called “improvement cuttings”), how much basal area should you leave?

It depends on average tree diameter, the predominant species, and whether you are managing by the even-age or all-age method. (See worksheets for marking, Notes 4.04 and 4.05).

The graph (for even-age management) and tabulation (for all-age management) given below, show how much basal area you should leave. Remember that the residual basal areas include only trees 4.6 inches in diameter and larger.

### Even-Age Management Guide

1. On the vertical axis of the graph, find the current basal area per acre of your stand; on the horizontal axis, find the number of trees per acre.
2. Extend a line horizontally from the basal area and vertically from the number of trees per acre. Where these lines meet is the average tree diameter.
3. Extend a line paralleling the average diameter lines to the appropriate species curve. Use the solid-line hemlock and basswood curves (those reading 100 percent) only if the stand you are thinning is at least 80 percent stocked with that particular species. Use the dashed curves for stands that are about 50 percent stocked.
4. Go horizontally from the intersection of the average diameter and species curve to read the *residual* basal area on the vertical axis. The indicated basal area will leave about 80 percent crown cover. Stands will grow 2.6 to 3.0 square feet of basal area per year. This will help you set the desired cutting cycle.



In theory at least, no two stands would ever be cut to the same residual basal area because no two stands have the same average diameter and species composition. The practical message is to watch for changes in stand diameter and composition, and change the residual stocking levels accordingly as you mark for thinning.

## All-Age Management Guide

1. Determine the stocking by diameter distribution.
2. Cut trees in each of the size classes to approximately match the suggested residual basal areas in the guide below. Trees 25 inches in diameter are considered economically mature. For trees larger than this the rate of return drops drastically.
3. Leave an occasional cull or poor quality tree as appropriate to discourage epicormic sprouting or forking on smaller but potentially better trees until their crowns develop.

D.b.h.	Residual	
	Trees	Basal area
<i>Inches</i>	<i>Number</i>	<i>Square feet</i>
5	21	2.9
6	15	2.9
7	12	3.2
8	9	3.1
9	8	3.5
Subtotal	65	16
10	7	3.8
11	6	4.0
12	5	3.9
13	5	4.6
14	5	5.3
Subtotal	28	22
15	4	4.9
16	4	5.6
17	3	4.7
18	3	5.3
19	3	5.9
Subtotal	17	26
20	2	4.4
21	2	4.8
22	2	5.3
23	1	2.9
24	1	3.1
Subtotal	8	20
TOTAL	118	84

The residual basal areas suggested should give the best overall volume and value growth for a commercial cut every 10 years. If you want larger trees (for esthetic or landscaping purposes, for example) you can establish a new size class. You then have to change the distribution of stocking among size classes. (See the use of the "q" factor in the reference).

## Reference

Tubbs, Carl; Oberg, Robert. How to calculate size-class distribution for all-age forests. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1978. 5 p.

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